US005471575A

United States Patent [19]

Giansante

[11] Patent Number: 5,471,575

[45] Date of Patent: Nov. 28, 1995

[54] **INTERACTIVE PARAMETER DRIVEN ITERATIVE FINANCIAL SPREADSHEET ANALYSIS WITH CONTEXT AND LAYOUT SENSITIVE HELP SCREEN**

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[73] Assignee: **Home Equity Software, Inc.**, Mountain View, Calif.

[21] Appl. No.: **816,892**

[22] Filed: **Jan. 3, 1992**

[51] **Int. Cl.**[6] **G06F 17/21**

[52] **U.S. Cl.** **395/144**; 395/161

[58] **Field of Search** 395/161, 144, 395/145, 146, 147, 148, 152, 153, 154, 155, 157, 158; 364/408, 419.1

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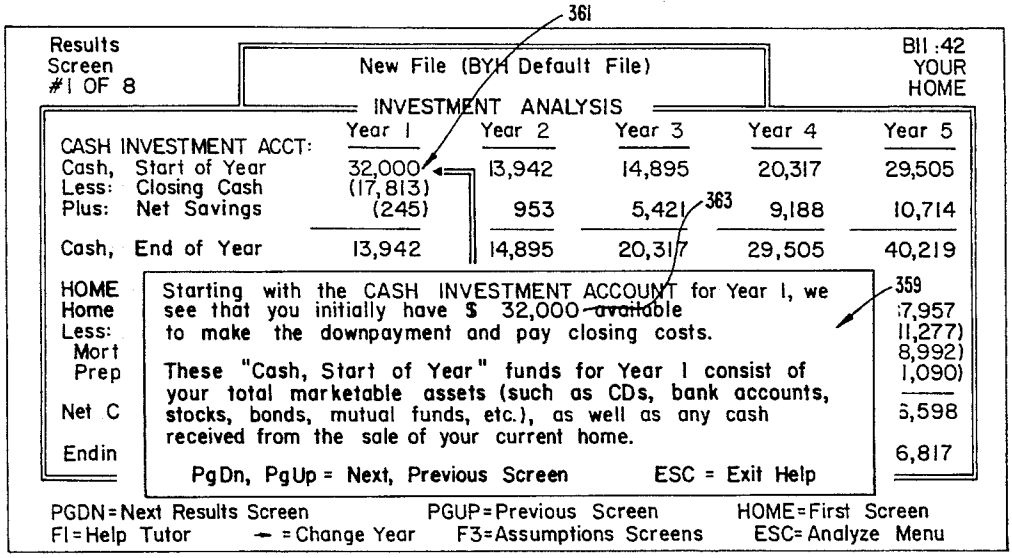
Primary Examiner—Heather R. Herndon
Assistant Examiner—Anton W. Fetting
Attorney, Agent, or Firm—Townsend and Townsend Khourie and Crew

[57] **ABSTRACT**

A financial analysis system for mathematically modeling an investment on a computer provides an improved computer user interface and a help method for teaching a user how to use the analysis system and for explaining the meaning of items on the screen. An investment term is broken up into two or more incremental periods and unique parameters may be associated with each incremental period so as to allow for the modeling of discrete events and permit varying of input assumptions of one or more incremental periods. In accordance with this scheme, results are displayed with each incremental period having its associated result or results. A method for displaying help text to explain the purpose, function and ordering of items displayed in a computer financial analysis system is disclosed. The help text is visually associated with an item that is displayed in context on the screen. Help text is automatically displayed in a predetermined sequence to explain items on the screen and to illustrate the logical flow of calculations performed on the items. Different help text may be displayed when the value of an item changes.

8 Claims, 15 Drawing Sheets


361
Results Screen #1 OF 8
New File (BYH Default File)
Bll :42 YOUR HOME
INVESTMENT ANALYSIS
Year 1
Year 2
Year 3
Year 4
Year 5
CASH INVESTMENT ACCT:
Cash, Start of Year 32,000 13,942 14,895 20,317 29,505
Less: Closing Cash (17,813)
Plus: Net Savings (245) 953 5,421 9,188 10,714
363
Cash, End of Year 13,942 14,895 20,317 29,505 40,219
HOME
Home
Less:
Mort
Prep
Net C
Endin
7,957
11,277)
8,992)
1,090)
5,598
6,817
Starting with the CASH INVESTMENT ACCOUNT for Year 1, we see that you initially have $ 32,000 available to make the downpayment and pay closing costs.
These "Cash, Start of Year" funds for Year 1 consist of your total marketable assets (such as CDs, bank accounts, stocks, bonds, mutual funds, etc.), as well as any cash received from the sale of your current home.
359
PgDn, PgUp = Next, Previous Screen
ESC = Exit Help
PGDN=Next Results Screen
PGUP=Previous Screen
HOME=First Screen
F1=Help Tutor
→ =Change Year
F3=Assumptions Screens
ESC=Analyze Menu

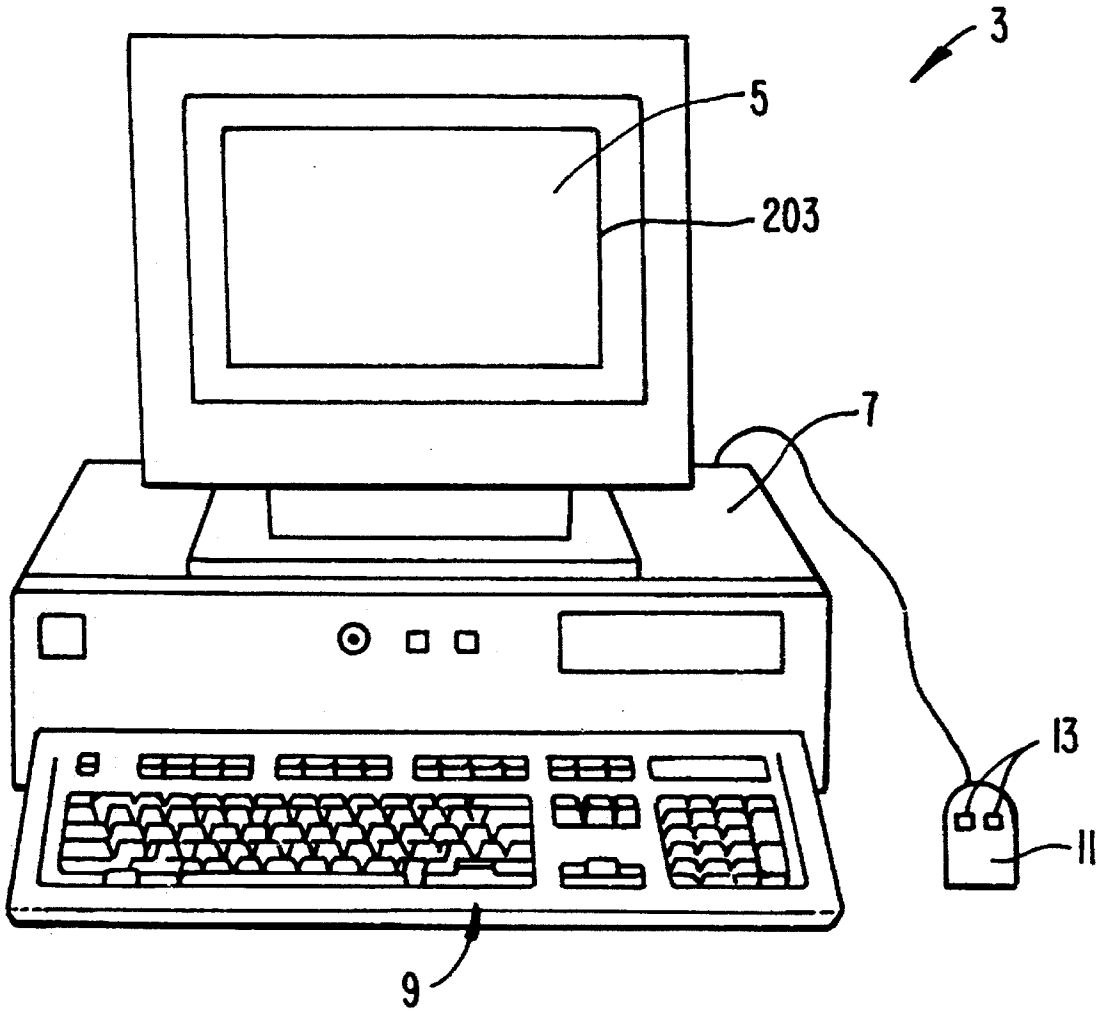


FIG. 1.

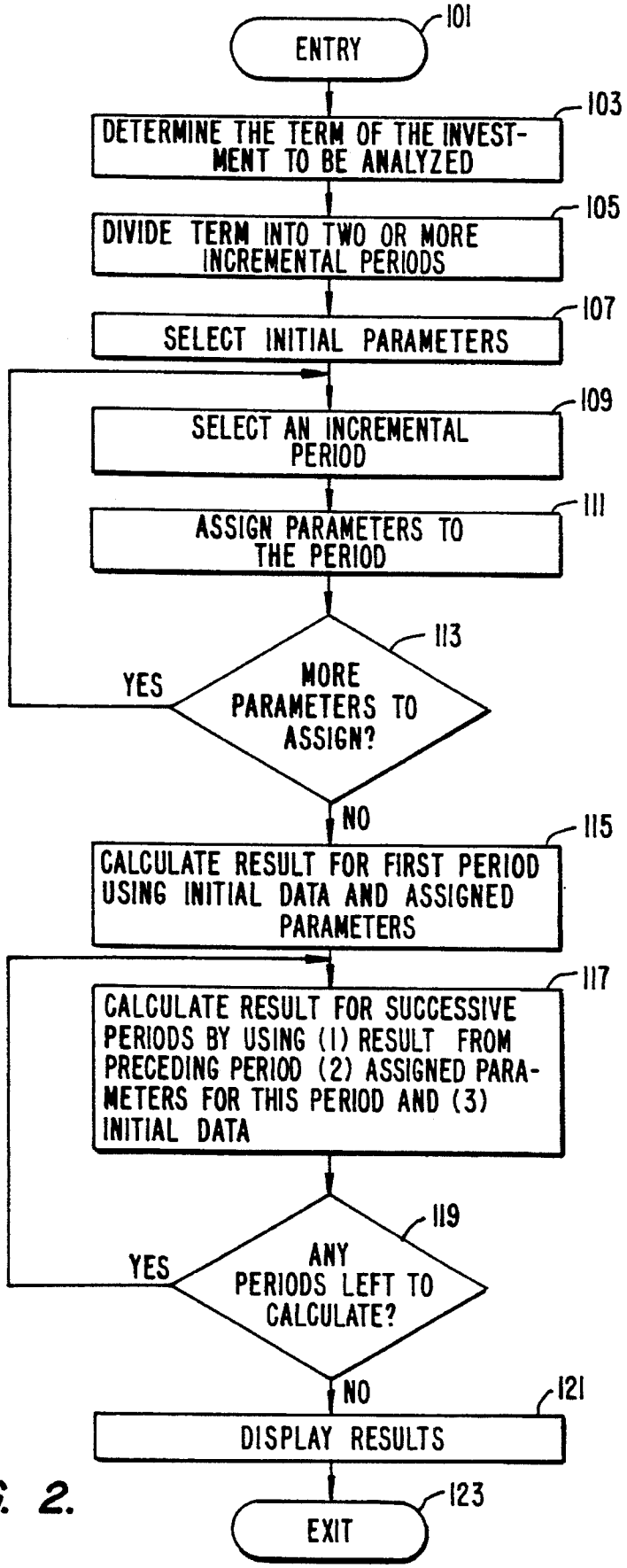

101
ENTRY
103
DETERMINE THE TERM OF THE INVESTMENT TO BE ANALYZED
105
DIVIDE TERM INTO TWO OR MORE INCREMENTAL PERIODS
107
SELECT INITIAL PARAMETERS
109
SELECT AN INCREMENTAL PERIOD
111
ASSIGN PARAMETERS TO THE PERIOD
113
MORE PARAMETERS TO ASSIGN?
YES
NO
115
CALCULATE RESULT FOR FIRST PERIOD USING INITIAL DATA AND ASSIGNED PARAMETERS
117
CALCULATE RESULT FOR SUCCESSIVE PERIODS BY USING (1) RESULT FROM PRECEDING PERIOD (2) ASSIGNED PARAMETERS FOR THIS PERIOD AND (3) INITIAL DATA
119
ANY PERIODS LEFT TO CALCULATE?
YES
NO
121
DISPLAY RESULTS
123
EXIT

FIG. 2.

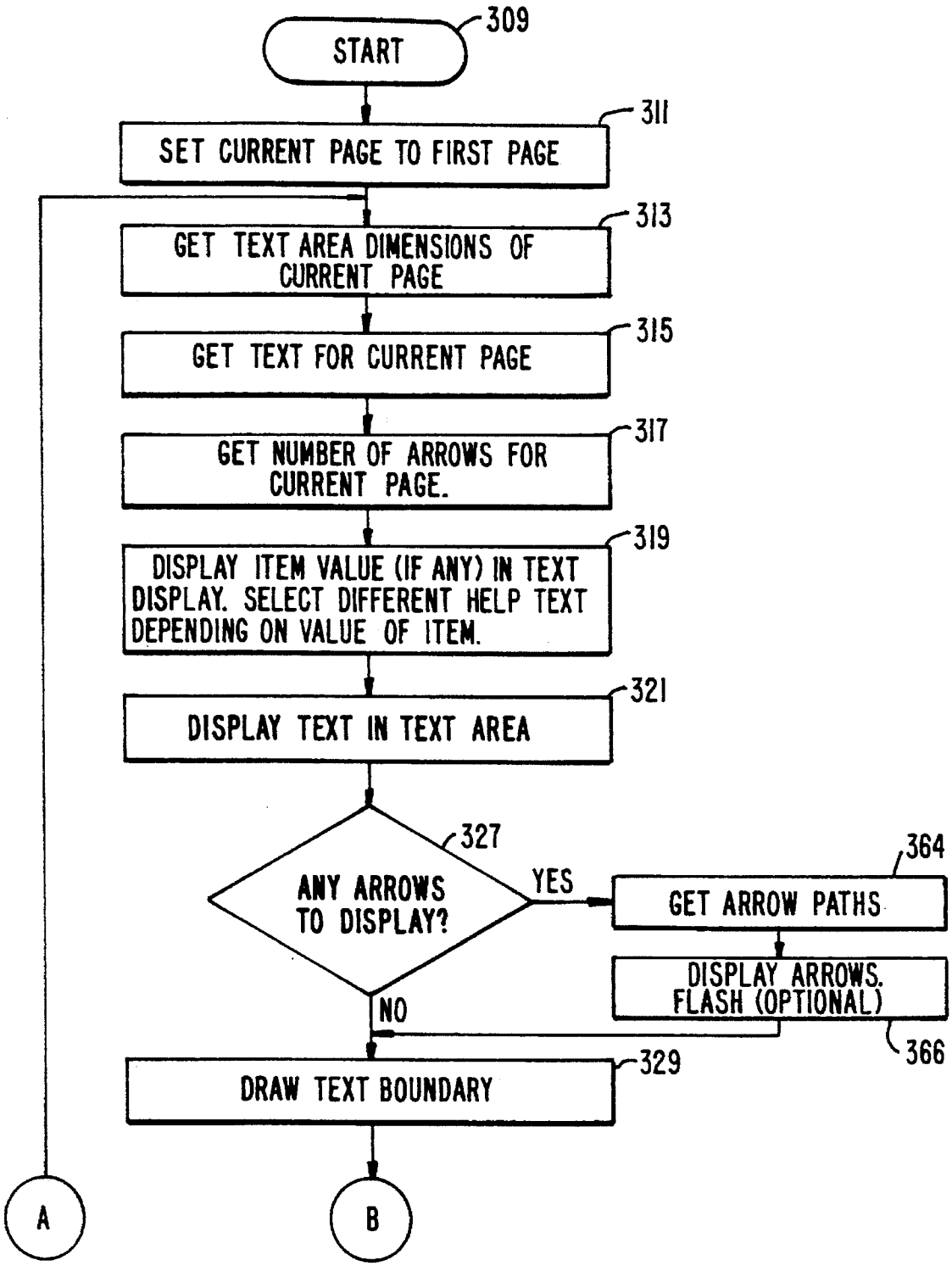

309
START
311
SET CURRENT PAGE TO FIRST PAGE
313
GET TEXT AREA DIMENSIONS OF CURRENT PAGE
315
GET TEXT FOR CURRENT PAGE
317
GET NUMBER OF ARROWS FOR CURRENT PAGE.
319
DISPLAY ITEM VALUE (IF ANY) IN TEXT DISPLAY. SELECT DIFFERENT HELP TEXT DEPENDING ON VALUE OF ITEM.
321
DISPLAY TEXT IN TEXT AREA
327
ANY ARROWS TO DISPLAY?
YES
364
GET ARROW PATHS
DISPLAY ARROWS. FLASH (OPTIONAL)
366
NO
329
DRAW TEXT BOUNDARY
A
B

FIG. 3A.

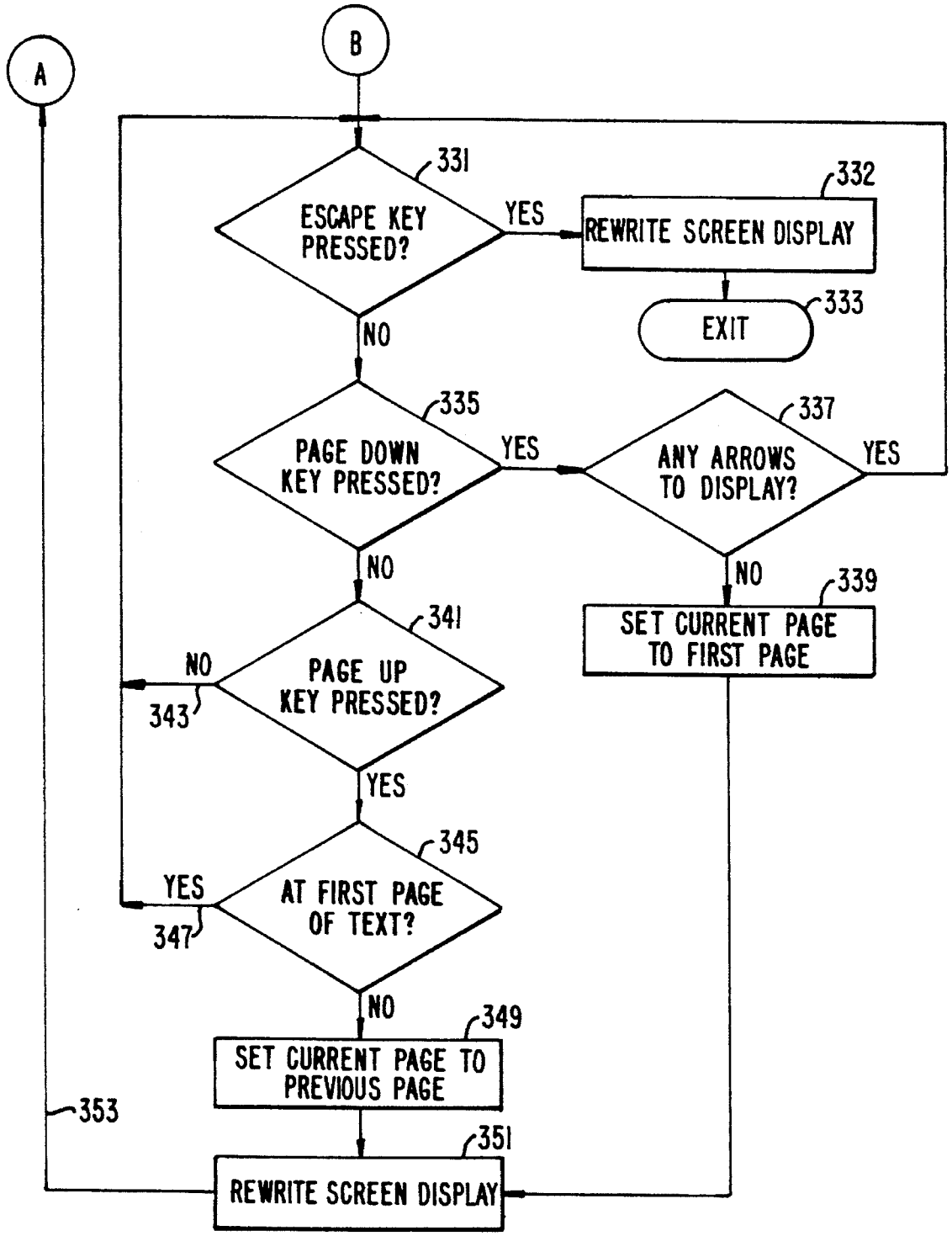

A
B
331
ESCAPE KEY PRESSED?
YES
332
REWRITE SCREEN DISPLAY
333
EXIT
NO
335
PAGE DOWN KEY PRESSED?
YES
337
ANY ARROWS TO DISPLAY?
YES
NO
339
SET CURRENT PAGE TO FIRST PAGE
NO
341
PAGE UP KEY PRESSED?
NO
343
YES
345
AT FIRST PAGE OF TEXT?
YES
347
NO
349
SET CURRENT PAGE TO PREVIOUS PAGE
353
351
REWRITE SCREEN DISPLAY

FIG. 3B.

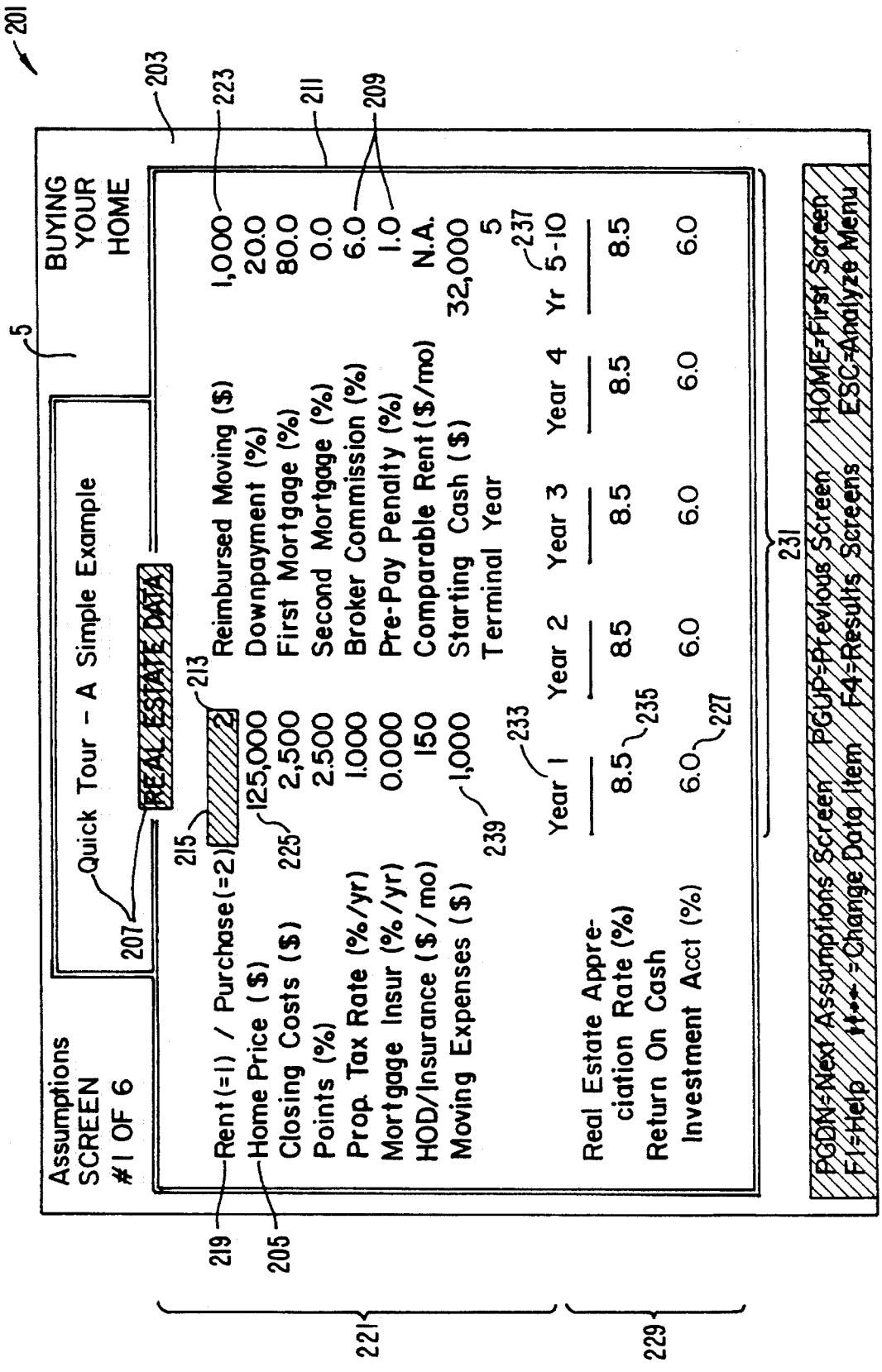

201
5
203
BUYING YOUR HOME
Assumptions SCREEN #1 OF 6
Quick Tour - A Simple Example
207
REAL ESTATE DATA
213
215
223
211
209
Rent(=1) / Purchase(=2)
2
Reimbursed Moving ($)
1,000
219
Home Price ($)
125,000
Downpayment (%)
20.0
205
Closing Costs ($)
225
2,500
First Mortgage (%)
80.0
Points (%)
2.500
Second Mortgage (%)
0.0
Prop. Tax Rate (%/yr)
1.000
Broker Commission (%)
6.0
Mortgage Insur (%/yr)
0.000
Pre-Pay Penalty (%)
1.0
HOD/Insurance ($/mo)
150
Comparable Rent ($/mo)
N.A.
Moving Expenses ($)
1,000
Starting Cash ($)
32,000
239
Terminal Year
5
233
237
Year 1 Year 2 Year 3 Year 4 Yr 5-10
Real Estate Appreciation Rate (%)
8.5
235
8.5
8.5
8.5
8.5
Return On Cash Investment Acct (%)
6.0
227
6.0
6.0
6.0
6.0
231
PGDN-Next Assumptions Screen PGUP-Previous Screen HOME-First Screen
F1=Help ↑↓←→=Change Data Item F4=Results Screens ESC=Analyze Menu
221
229

FIG. 4.

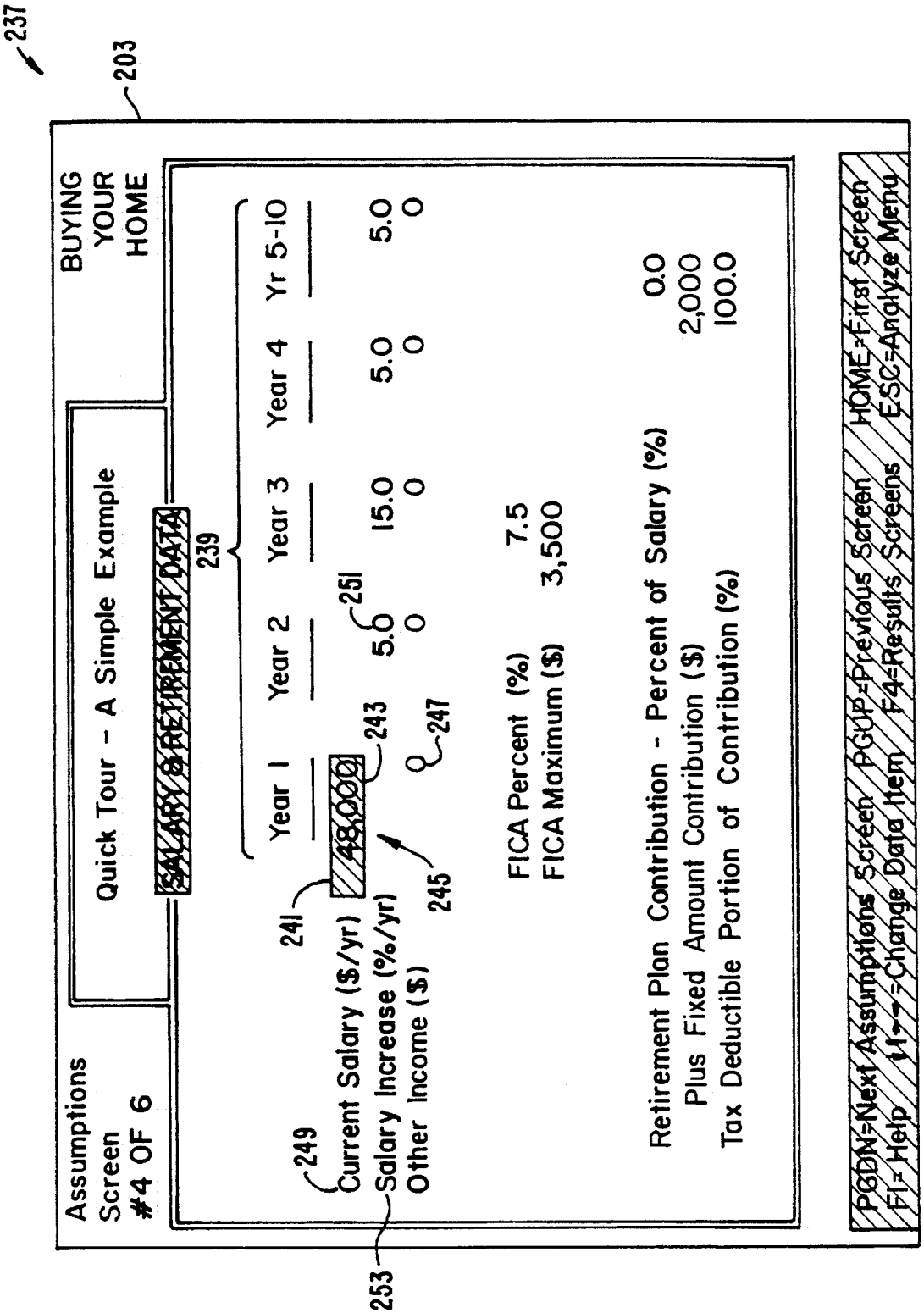

237
203
BUYING YOUR HOME
Assumptions Screen #4 OF 6
Quick Tour - A Simple Example
SALARY & RETIREMENT DATA
239
Year 1
Year 2
Year 3
Year 4
Yr 5-10
241
249
Current Salary ($/yr)
48,000
243
Salary Increase (%/yr)
5.0
251
15.0
5.0
5.0
Other Income ($)
0
0
0
0
247
245
253
FICA Percent (%) 7.5
FICA Maximum ($) 3,500
Retirement Plan Contribution - Percent of Salary (%) 0.0
Plus Fixed Amount Contribution ($) 2,000
Tax Deductible Portion of Contribution (%) 100.0
PGDN=Next Assumptions Screen PGUP=Previous Screen HOME=First Screen
F1=Help ↑↓←→=Change Data Item F4=Results Screens ESC=Analyze Menu

FIG. 5.

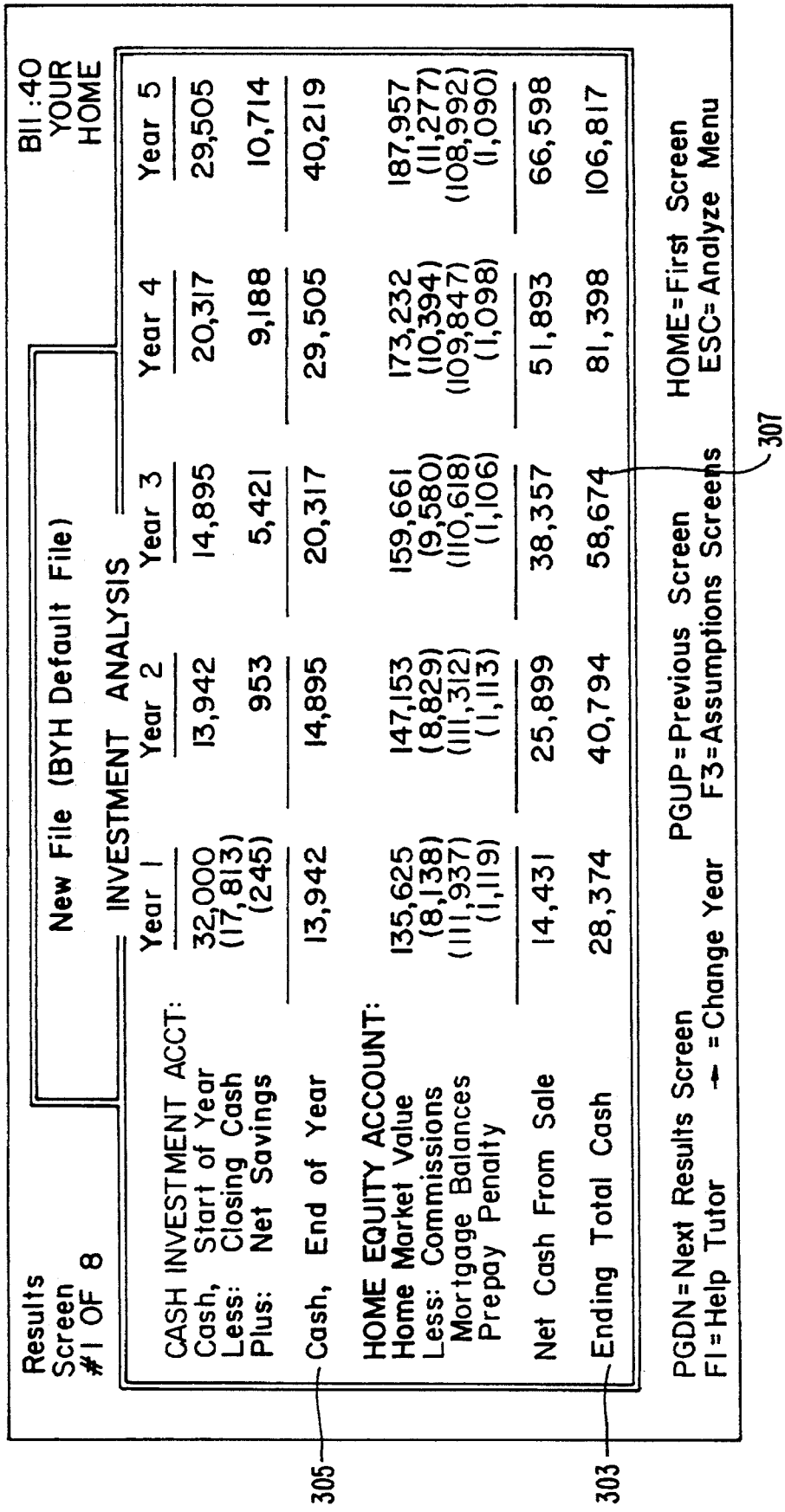

301
Results Screen #1 OF 8
New File (BYH Default File)
Bll:40 YOUR HOME
INVESTMENT ANALYSIS
Year 1 Year 2 Year 3 Year 4 Year 5
CASH INVESTMENT ACCT:
Cash, Start of Year 32,000 13,942 14,895 20,317 29,505
Less: Closing Cash (17,813)
Plus: Net Savings (245) 953 5,421 9,188 10,714
Cash, End of Year 13,942 14,895 20,317 29,505 40,219
HOME EQUITY ACCOUNT:
Home Market Value 135,625 147,153 159,661 173,232 187,957
Less: Commissions (8,138) (8,829) (9,580) (10,394) (11,277)
Mortgage Balances (111,937) (111,312) (110,618) (109,847) (108,992)
Prepay Penalty (1,119) (1,113) (1,106) (1,098) (1,090)
Net Cash From Sale 14,431 25,899 38,357 51,893 66,598
Ending Total Cash 28,374 40,794 58,674 81,398 106,817
305
303
307
PGDN=Next Results Screen
F1=Help Tutor
PGUP=Previous Screen
←→=Change Year
F3=Assumptions Screens
HOME=First Screen
ESC=Analyze Menu

FIG. 6.

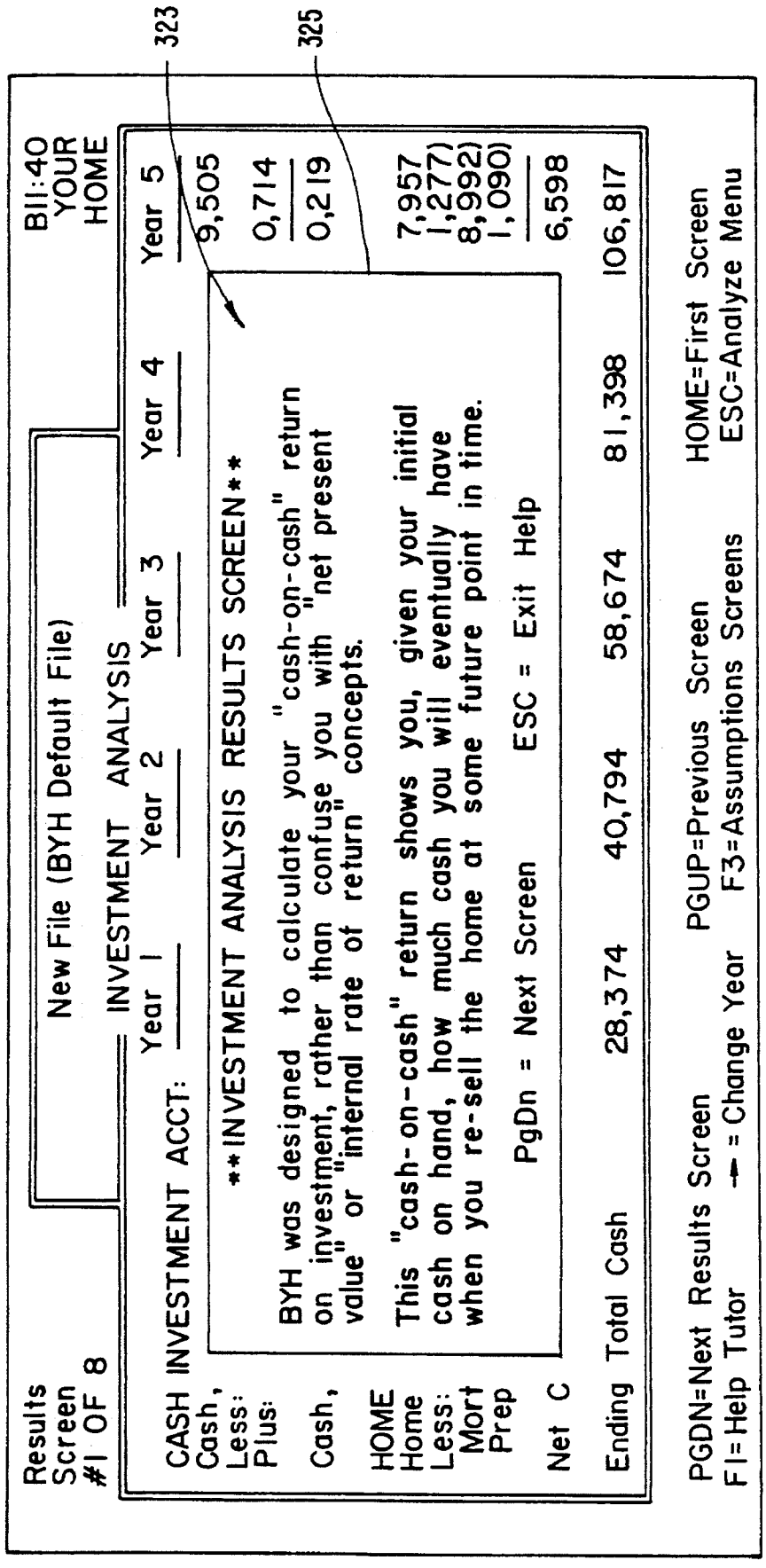

Results Screen #1 OF 8
New File (BYH Default File)
INVESTMENT ANALYSIS
B11:40 YOUR HOME
323
325
CASH INVESTMENT ACCT:
Year 1
Year 2
Year 3
Year 4
Year 5
Cash,
Less:
Plus:
9,505
0,714
0,219
Cash,
HOME
Home
Less:
Mort
Prep
7,957
1,277)
8,992)
1,090)
Net C
6,598
Ending Total Cash
28,374
40,794
58,674
81,398
106,817
INVESTMENT ANALYSIS RESULTS SCREEN
BYH was designed to calculate your "cash-on-cash" return on investment, rather than confuse you with "net present value" or "internal rate of return" concepts.
This "cash-on-cash" return shows you, given your initial cash on hand, how much cash you will eventually have when you re-sell the home at some future point in time.
PgDn = Next Screen
ESC = Exit Help
PGDN=Next Results Screen
PGUP=Previous Screen
HOME=First Screen
F1=Help Tutor
→ = Change Year
F3=Assumptions Screens
ESC=Analyze Menu

FIG. 7.

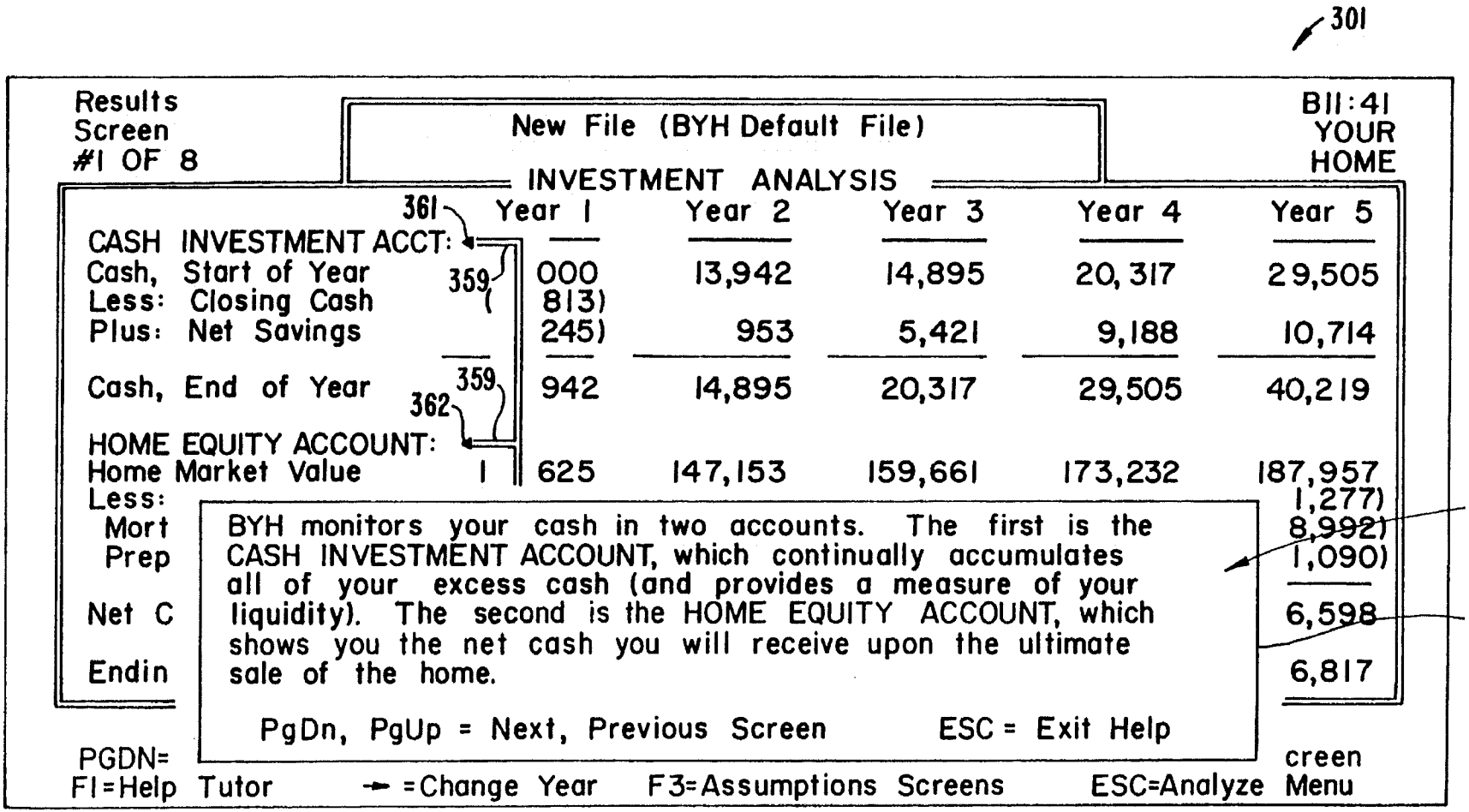

301
Results Screen #1 OF 8
New File (BYH Default File)
INVESTMENT ANALYSIS
B11:41 YOUR HOME
361
Year 1
Year 2
Year 3
Year 4
Year 5
CASH INVESTMENT ACCT:
Cash, Start of Year
359
Less: Closing Cash
Plus: Net Savings
Cash, End of Year
359
362
HOME EQUITY ACCOUNT:
Home Market Value
Less:
Mort
Prep
Net C
Endin
000
813)
245)
942
625
13,942
953
14,895
5,421
20,317
9,188
29,505
10,714
40,219
147,153
159,661
173,232
187,957
1,277)
8,992)
1,090)
6,598
6,817
353
357
BYH monitors your cash in two accounts. The first is the CASH INVESTMENT ACCOUNT, which continually accumulates all of your excess cash (and provides a measure of your liquidity). The second is the HOME EQUITY ACCOUNT, which shows you the net cash you will receive upon the ultimate sale of the home.
PgDn, PgUp = Next, Previous Screen
ESC = Exit Help
PGDN=
creen
F1=Help Tutor
→ =Change Year
F3=Assumptions Screens
ESC=Analyze
Menu

FIG. 8.

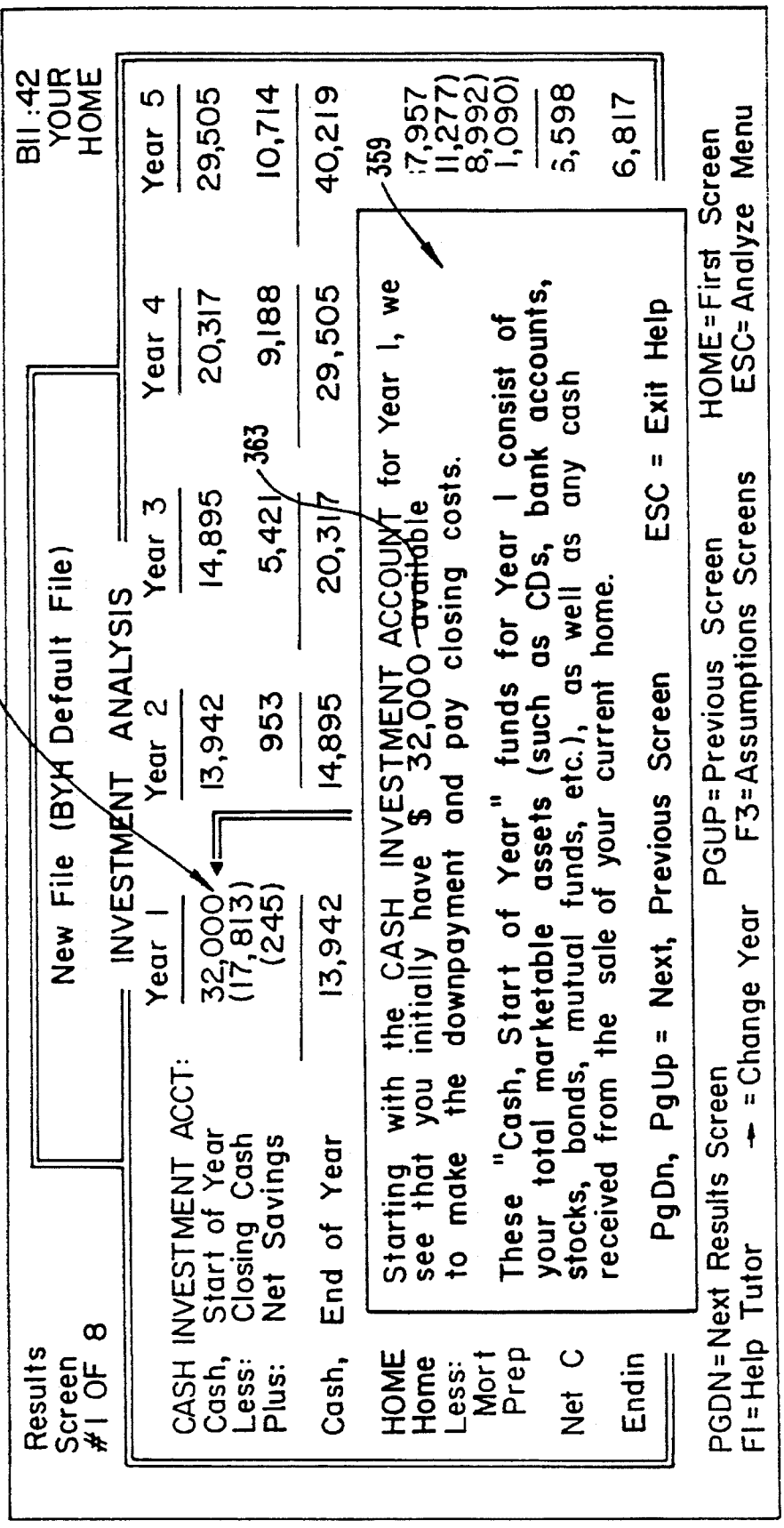

Results
Screen
#1 OF 8
New File (BY# Default File)
BII:42
YOUR
HOME
INVESTMENT ANALYSIS
361
CASH INVESTMENT ACCT:
Cash, Start of Year
Less: Closing Cash
Plus: Net Savings
Cash, End of Year
Year 1
32,000
(17,813)
(245)
13,942
Year 2
13,942
953
14,895
Year 3
14,895
5,421
20,317
Year 4
20,317
9,188
29,505
Year 5
29,505
10,714
40,219
363
359
HOME
Home
Less:
Mort
Prep
Net C
Endin
Starting with the CASH INVESTMENT ACCOUNT for Year 1, we see that you initially have $ 32,000 available to make the downpayment and pay closing costs.
These "Cash, Start of Year" funds for Year 1 consist of your total marketable assets (such as CDs, bank accounts, stocks, bonds, mutual funds, etc.), as well as any cash received from the sale of your current home.
7,957
11,277)
8,992)
1,090)
5,598
6,817
PgDn, PgUp = Next, Previous Screen
ESC = Exit Help
PGDN=Next Results Screen
PGUP=Previous Screen
HOME=First Screen
F1=Help Tutor
← =Change Year
F3=Assumptions Screens
ESC=Analyze Menu

FIG. 9.

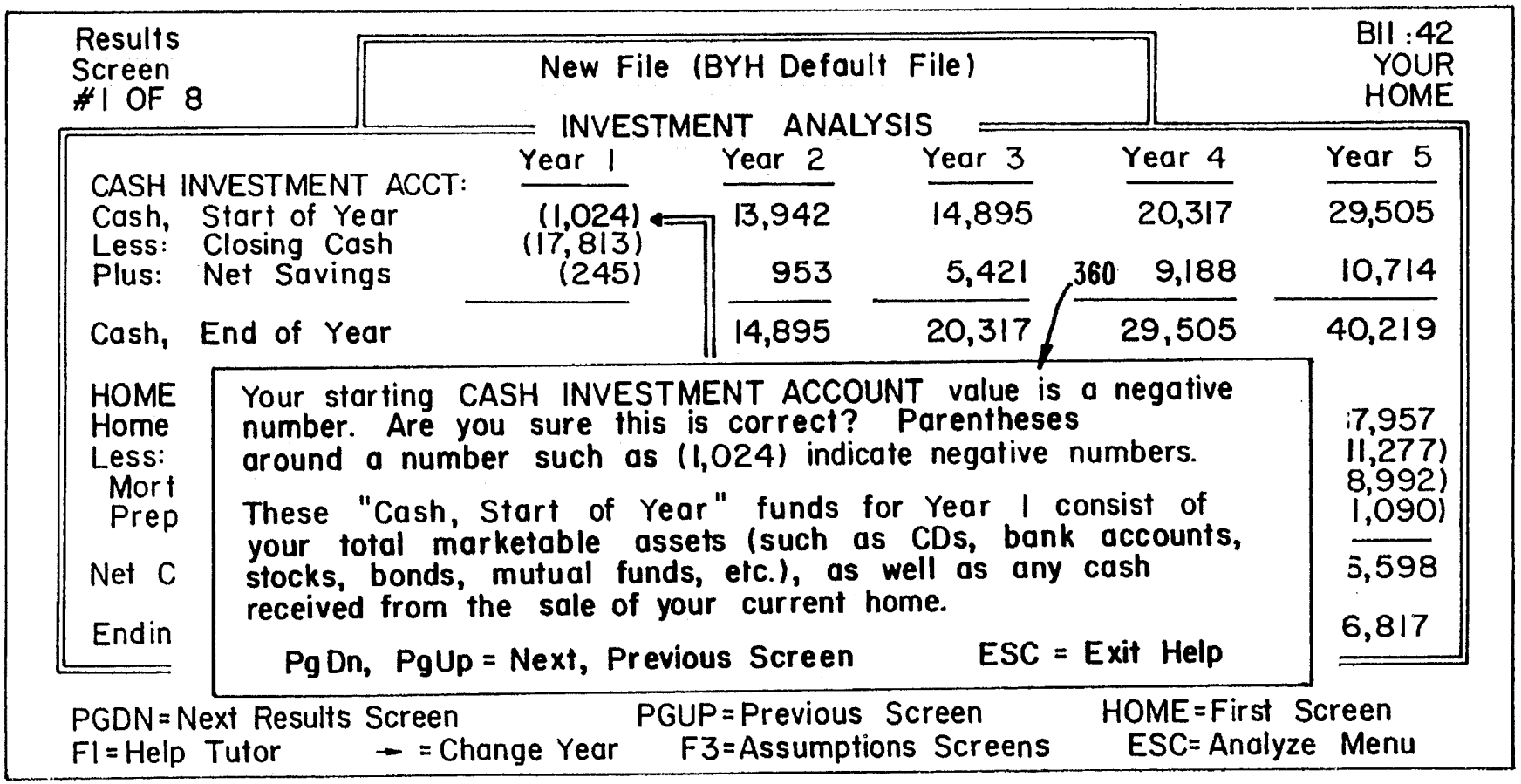

Results
Screen
#1 OF 8
New File (BYH Default File)
BII:42
YOUR
HOME
INVESTMENT ANALYSIS
Year 1
Year 2
Year 3
Year 4
Year 5
CASH INVESTMENT ACCT:
Cash, Start of Year (1,024) 13,942 14,895 20,317 29,505
Less: Closing Cash (17,813)
Plus: Net Savings (245) 953 5,421 9,188 10,714
Cash, End of Year 14,895 20,317 29,505 40,219
360
HOME
Home
Less:
Mort
Prep
Net C
Endin
7,957
11,277)
8,992)
1,090)
5,598
6,817
Your starting CASH INVESTMENT ACCOUNT value is a negative number. Are you sure this is correct? Parentheses around a number such as (1,024) indicate negative numbers.
These "Cash, Start of Year" funds for Year 1 consist of your total marketable assets (such as CDs, bank accounts, stocks, bonds, mutual funds, etc.), as well as any cash received from the sale of your current home.
PgDn, PgUp = Next, Previous Screen
ESC = Exit Help
PGDN=Next Results Screen
PGUP=Previous Screen
HOME=First Screen
F1=Help Tutor
→ =Change Year
F3=Assumptions Screens
ESC=Analyze Menu

FIG. 9A.

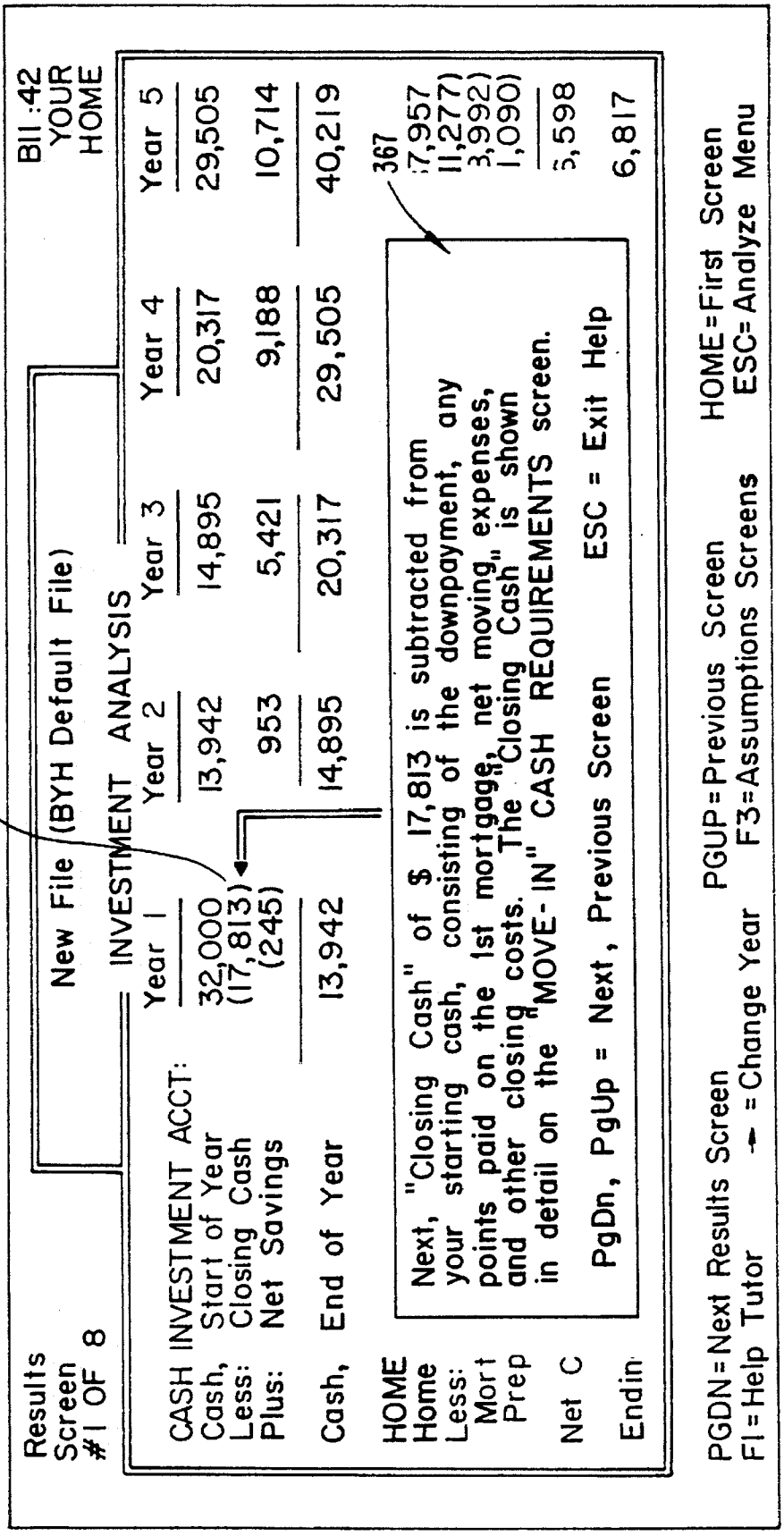

Results Screen #1 OF 8
New File (BYH Default File)
11:42 YOUR HOME
INVESTMENT ANALYSIS
365
CASH INVESTMENT ACCT:
Year 1
Year 2
Year 3
Year 4
Year 5
Cash, Start of Year 32,000 13,942 14,895 20,317 29,505
Less: Closing Cash (17,813) 953 5,421 9,188 10,714
Plus: Net Savings (245)
Cash, End of Year 13,942 14,895 20,317 29,505 40,219
HOME
Home
Less:
Mort
Prep
Net C
Endin
Next, "Closing Cash" of $ 17,813 is subtracted from your starting cash, consisting of the downpayment, any points paid on the 1st mortgage, net moving expenses, and other closing costs. The "Closing Cash" is shown in detail on the "MOVE-IN" CASH REQUIREMENTS screen.
367
7,957
11,277)
3,992)
1,090)
3,598
6,817
PgDn, PgUp = Next, Previous Screen
ESC = Exit Help
PGDN=Next Results Screen
PGUP=Previous Screen
HOME=First Screen
F1=Help Tutor
→ =Change Year
F3=Assumptions Screens
ESC=Analyze Menu

FIG. 10.

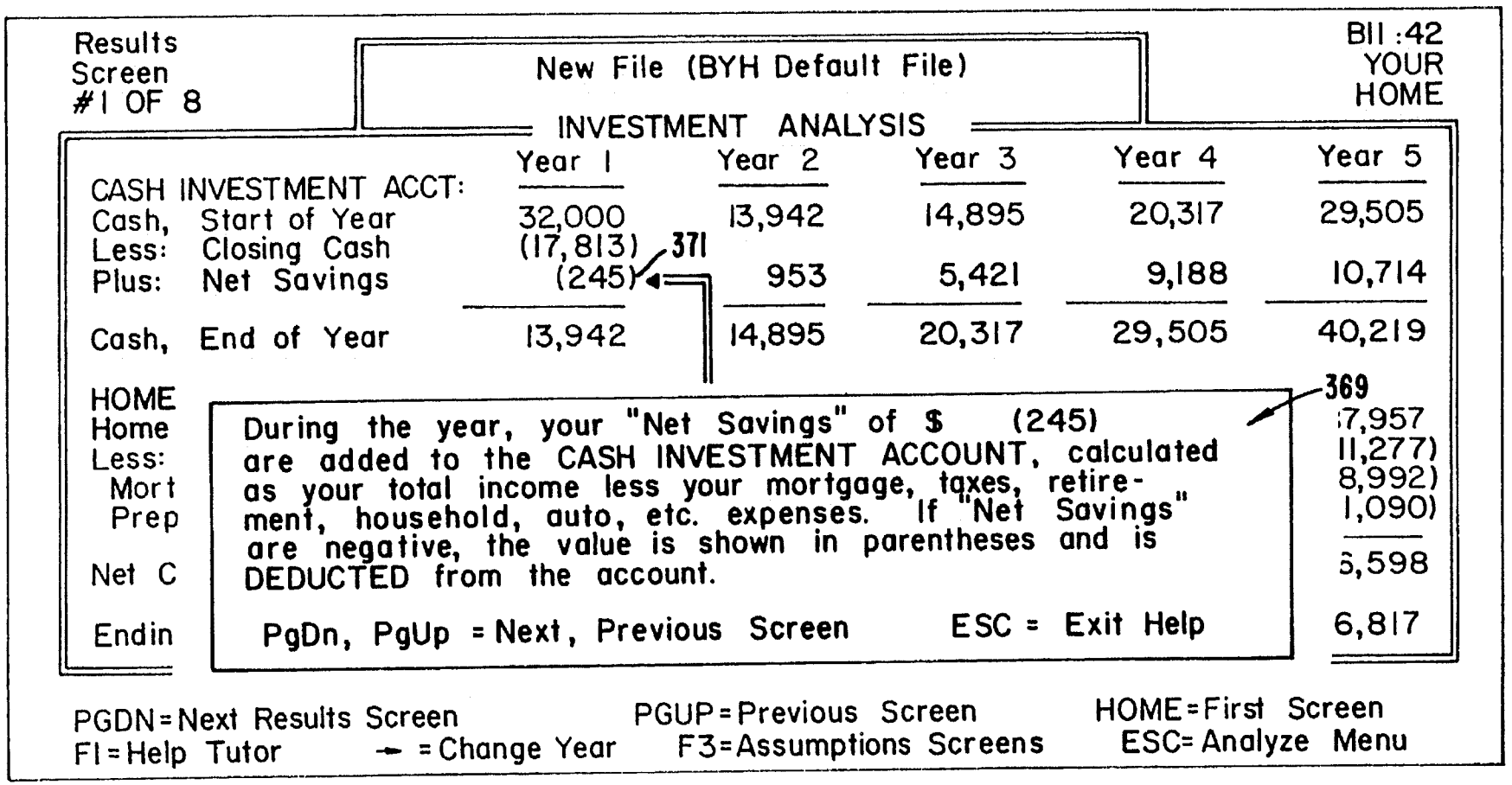

Results
Screen
#1 OF 8
New File (BYH Default File)
BII:42
YOUR
HOME
INVESTMENT ANALYSIS
Year 1
Year 2
Year 3
Year 4
Year 5
CASH INVESTMENT ACCT:
Cash, Start of Year 32,000 13,942 14,895 20,317 29,505
Less: Closing Cash (17,813)
Plus: Net Savings (245) 953 5,421 9,188 10,714
Cash, End of Year 13,942 14,895 20,317 29,505 40,219
371
369
HOME
Home
Less:
Mort
Prep
Net C
Endin
7,957
11,277)
8,992)
1,090)
5,598
6,817
During the year, your "Net Savings" of $ (245) are added to the CASH INVESTMENT ACCOUNT, calculated as your total income less your mortgage, taxes, retirement, household, auto, etc. expenses. If "Net Savings" are negative, the value is shown in parentheses and is DEDUCTED from the account.
PgDn, PgUp = Next, Previous Screen
ESC = Exit Help
PGDN=Next Results Screen
PGUP=Previous Screen
HOME=First Screen
F1=Help Tutor
→ =Change Year
F3=Assumptions Screens
ESC=Analyze Menu

FIG. 11.

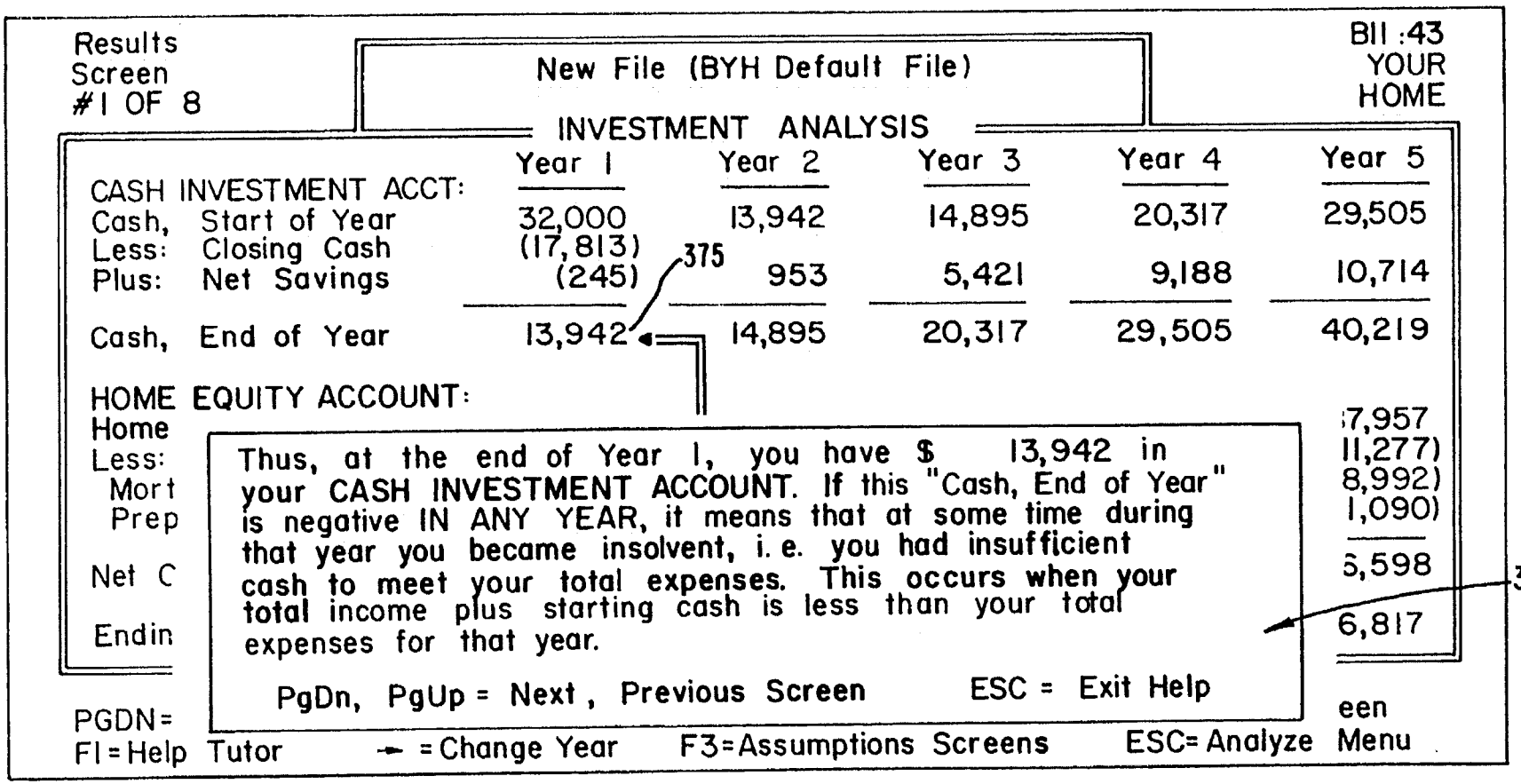

Results
Screen
#1 OF 8
New File (BYH Default File)
BII:43
YOUR
HOME
INVESTMENT ANALYSIS
Year 1
Year 2
Year 3
Year 4
Year 5
CASH INVESTMENT ACCT:
Cash, Start of Year 32,000 13,942 14,895 20,317 29,505
Less: Closing Cash (17,813)
Plus: Net Savings (245) 953 5,421 9,188 10,714
375
Cash, End of Year 13,942 14,895 20,317 29,505 40,219
HOME EQUITY ACCOUNT:
Home
Less:
Mort
Prep
Net C
Endin
7,957
11,277)
8,992)
1,090)
5,598
6,817
Thus, at the end of Year 1, you have $ 13,942 in your CASH INVESTMENT ACCOUNT. If this "Cash, End of Year" is negative IN ANY YEAR, it means that at some time during that year you became insolvent, i.e. you had insufficient cash to meet your total expenses. This occurs when your total income plus starting cash is less than your total expenses for that year.
373
PgDn, PgUp = Next, Previous Screen
ESC = Exit Help
PGDN=
een
F1=Help Tutor
= Change Year
F3=Assumptions Screens
ESC=Analyze Menu

FIG. 12.

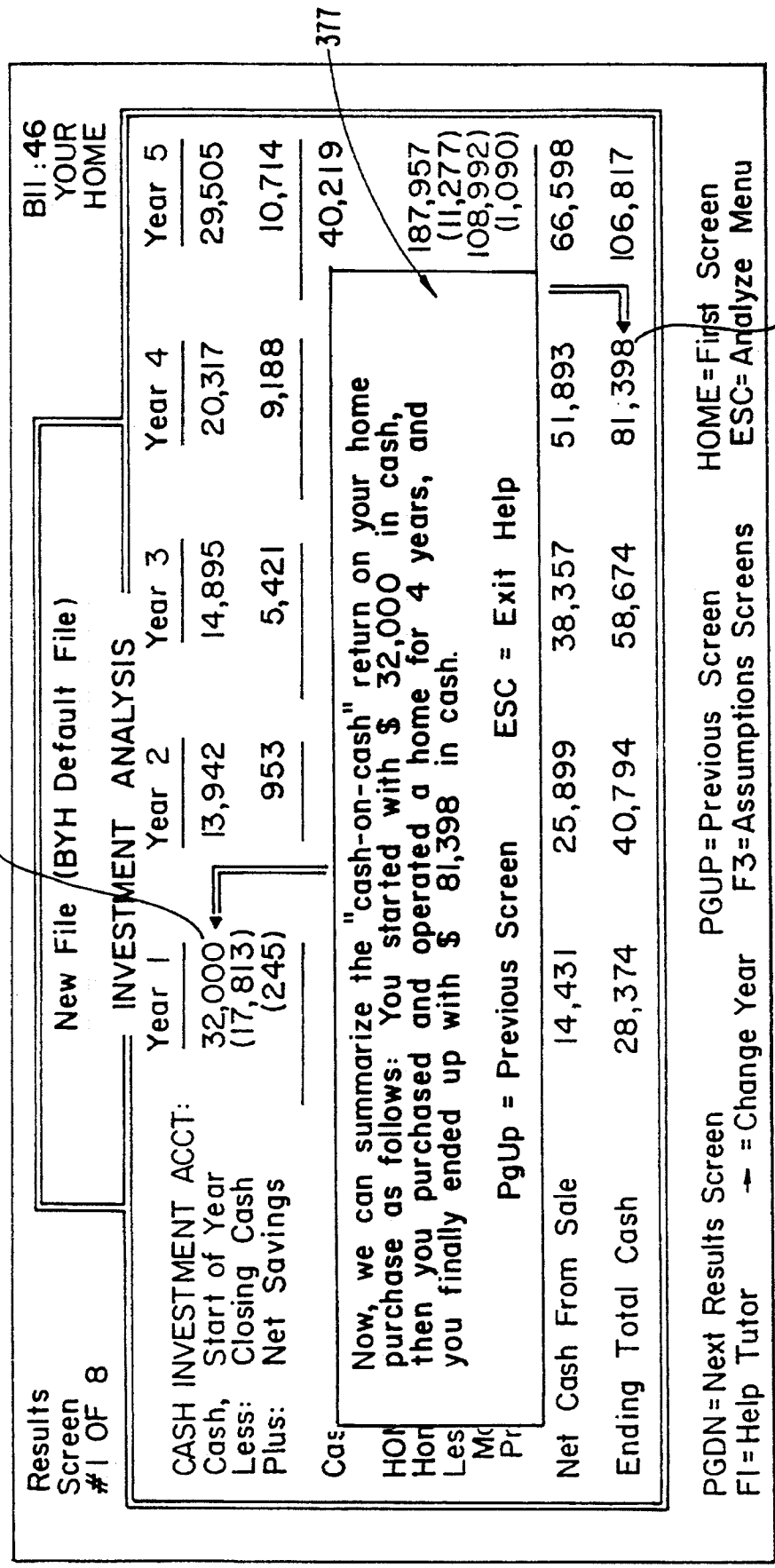

Results
Screen
#1 OF 8
New File (BYH Default File)
INVESTMENT ANALYSIS
B11:46
YOUR
HOME
379
377
381
CASH INVESTMENT ACCT:
Cash, Start of Year
Less: Closing Cash
Plus: Net Savings
Year 1
32,000
(17,813)
(245)
Year 2
13,942
953
Year 3
14,895
5,421
Year 4
20,317
9,188
Year 5
29,505
10,714
40,219
187,957
(11,277)
108,992)
(1,090)
Now, we can summarize the "cash-on-cash" return on your home
purchase as follows: You started with $ 32,000 in cash,
then you purchased and operated a home for 4 years, and
you finally ended up with $ 81,398 in cash.
PgUp = Previous Screen
ESC = Exit Help
Net Cash From Sale
14,431
25,899
38,357
51,893
66,598
Ending Total Cash
28,374
40,794
58,674
81,398
106,817
PGDN=Next Results Screen
F1=Help Tutor
PGUP=Previous Screen
← =Change Year
F3=Assumptions Screens
HOME=First Screen
ESC=Analyze Menu

FIG. 13.

INTERACTIVE PARAMETER DRIVEN ITERATIVE FINANCIAL SPREADSHEET ANALYSIS WITH CONTEXT AND LAYOUT SENSITIVE HELP SCREEN

BACKGROUND OF THE INVENTION

Field of the Invention

This invention relates generally to the field of computer financial analysis systems and more specifically to a user interface for such a system.

Current computer financial analysis systems allow a user to input personal financial data such as salary, expenses, assets, and investments which represent the user's initial financial state. The system will then output predictions of the user's future financial status based on mathematical models. Financial analysis systems typically analyze mortgage refinancing, loan amortization, renting or leasing versus buying a home, retirement planning, investment analysis and achieving financial goals. The input of the financial analysis system is typically a set of numbers. The output of the system may be a single number or it may be a table of numbers or a chart or graph.

The difficulty in designing a financial analysis system for a personal or home user is that in order to provide an accurate analysis, many figures have to be both entered by the user and interpreted by the user as output by the computer. Often the user is confronted with an entire display screen filled with numbers and short, often abbreviated, descriptive headings in both the input and output screens. If the user is unfamiliar with the names and functions of each of the numbers in the display, it will prevent the user from correctly and efficiently using the financial analysis system, and more seriously, will lead to incorrect conclusions about the user's financial state of affairs.

Traditional financial analysis systems use various methods to explain to the user the purpose of items on the screen. One method is called "hypertext" which allows a user to "point" to an item on the screen, for example, by using a cursor controlled by a mouse or by highlighting the items through keyboard selection. After an item is pointed to, the user presses a help button and a paragraph or two explaining the item, the item's purpose and function pops up onto the display screen. This help text remains on the screen until the user presses a keyboard or mouse button whereupon the help text disappears and the user is returned to the initial display. The user can proceed to highlight another item to obtain more help text for any of the items on the screen.

A problem with prior art systems is that the help text, when displayed, overlays some initial screen information which would be helpful to the user in understanding the function of the item. Sometimes, even the item itself is overlayed so that the user loses visual reference to the item. Other systems remove the initial display completely and present the user with a completely new screen containing the help text. When the user decides to go back to the initial display, the help text is removed and the initial display is restored.

With this latter technique, the user loses all visual reference to the item which is being explained by the help text. Such visual reference is important when the item is one of many numbers shown on the screen and the number's placement, relative to other displayed information, is helpful in understanding its function.

The second problem with the hypertext method of providing help information is that a sequence or "flow" of help

information between items is not established. This is because it is the user who is selecting the items to be explained and the user may randomly or haphazardly choose to have items explained in a sequence which is not representative of the role of the items in a computation. For example, in the calculation of A+B=C, the user may first select an explanation of A and then an explanation of C, which probably does not provide as good an understanding of the computation as if A and B were explained before C was explained.

Other help methods are even less adequate in explaining the function of items in a financial analysis system display screen. These methods often provide information about items in a manual-like format where the function of items is discussed as if the user were reading a textbook and turning pages by pressing keyboard or mouse buttons. The text in these methods often occupies the whole of the screen so that the user is provided with no visual reference of the items whatsoever.

As mentioned above, financial analysis systems use mathematical models to predict the effect that various factors will have on the user's financial status over the term of an investment. Every attempt is made to simplify the use of the system by keeping the number of inputs from the user low and by presenting the output as a single number or a graph. However, this simplification is at a sacrifice in the flexibility of the financial analysis system as the user is only allowed to specify their financial status at the beginning of the term and the system calculates their financial status at the end of the term. This is in contrast with the real world where an individual's financial situation is affected on a day-to-day basis throughout the term of the investment.

For example, assuming a user trying to simulate a one-year investment, a traditional financial analysis system would have the user specify starting parameters such as the amount of investment and rate of return and then use these parameters to calculate the accrued value at the end of one year. This does not take into account the possibility that the interest rate may fluctuate within the year. As another example, in a cash flow analysis other one-time events, such as an increase in salary, may occur during the investment term being modeled. The math models used in current financial analysis systems make it difficult to handle discrete events, that is, parameters whose values change during the course of the investment term.

Financial analysis systems on the market today generally use a "present value" or "internal rate of return" analysis methodology. These methods operate, respectively, by calculating the present value of the stream of cash flows or by calculating the internal rate of return associated with the cash flow stream. Such methods are well-known in the art.

In each method a discount rate may be specified by the user; however, this discount rate is maintained constant throughout the calculation. This is not an accurate reflection of actual discount rates which can fluctuate with time. Moreover, these math models based on present value or internal rate of return provide no means of modeling discrete events such as "windfall" capital realizations, one-time or intermittent expenses, or other discrete events which would affect a user's income in a non-continuous manner.

Further, the use of present value or internal rate of return analysis methodologies is confusing to the average user of a financial analysis system since these methodologies do not represent any actual quantity of cash held by the user at any time during the investments. The internal rate of return approach suffers from an additional shortcoming in that it

gives no weight to the relative "size" of the investment. For example, an investment of $1,000 which returns $1,500 in five years has the same internal rate of return as an investment of $100,000 returning $150,100, even though in the second case the amount earned is 100 times larger than the first case. This is because the internal rate of return expresses its result as the ratio of return to investment.

SUMMARY OF THE INVENTION

Accordingly, the present invention provides a means by which help text may be displayed on a display screen in a financial analysis system executing on a computer. The help text describes an item on the screen and a pointer or arrow connects the help text with the item being described.

The present invention implements a help tutor which can automatically display help text in a predetermined sequence to explain items on the screen and illustrate the logical flow of the calculations performed on the items. Different help text may be displayed for different values of an item. For example, if the item is a number and its value is positive then a first help text can be displayed, if the value of the item is negative a second help text can be displayed. The invention also allows a user to model discrete events such as changes in the investment rate or income and expenditures which occur at selected points during the investment term being modeled, as contrasted with continuous events which may be modeled by an equation with parameters whose values do not change.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is an illustration of a computer system.

FIG. **2** is a diagram illustrating the logic flow for a method of calculating financial results.

FIGS. **3**A and **3**B are a diagram illustrating the logic flow for a method to display help text on a computer screen.

FIG. **4** is a first screen display of the present invention which allows the user to input parameters.

FIG. **5** is a second screen display for allowing the input of additional parameters.

FIG. **6** is a third screen display for outputing results.

FIG. **7** shows the screen display of FIG. **6** with first help text.

FIG. **8** shows the screen display of FIG. **6** with second help text and arrows.

FIG. **9**A shows different help text displayed for a different value.

FIG. **9** shows the screen display of FIG. **6** with third help text and an arrow.

FIG. **10** shows the screen display of FIG. **6** with fourth help text and an arrow.

FIG. **11** shows the screen display of FIG. **6** with fifth help text and an arrow.

FIG. **12** shows the screen display of FIG. **6** with sixth help text and an arrow.

FIG. **13** shows the screen display of FIG. **6** with seventh help text and two arrows.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The present invention is a financial analysis system which allows a user to input an initial set of data representing a financial state or status. The financial analysis system then uses a mathematical model to make predictions about a future financial state. The invention uses a computer system **1** as shown in FIG. **1**. Computer system **1** comprises a display **3** having a screen **5**. Computer system **1** further comprises a cabinet **7** within which are standard computer components (not shown) such as disk drives, memory, central processor, peripheral adapter cards, etc. Computer system **1** may have user input devices such as a keyboard **9** or a mouse **11**. Mouse **11** may have one or more buttons **13**.

FIG. **2** shows the logical flow of the steps in a method for calculating results based on an initial set of financial data. The method assumes that the financial analysis can be characterized as an investment over a term or fixed period of time. The method further assumes that the user has enough information to accurately define an initial set of data describing the user's present financial situation with respect to the investment. Also, the user must have enough information to characterize the "market forces" such as the rate of home price appreciation.

For example, such a financial analysis would apply to buying a home, where the buyer's current savings and salary are known along with the price of the house and expected expenses in purchasing the house. These values would be part of the initial set of data defining the user's financial state. Other values such as the rate of home price appreciation, interest rate on the mortgage, salary increases, and taxes would be some of the parameters input by the user and used in the math model to calculate the future financial state. The methods described below in reference to FIG. **2** allows the user to take into account one-time factors or factors which change over the term of the analysis because the user may input parameters which are only effective for a short period of time within the overall term of the investment.

In FIG. **2** the method or procedure has an entry point **101**. Step **103** determines the term of the investment. Using the purchase of a home as an example, the user may decide to analyze the home purchase over a ten year term. Thus, the term of the investment is set at ten years. Step **105** divides the term into two or more incremental periods. In the example, the ten year term can be conveniently divided into ten one-year incremental periods. In step **107**, initial parameters are selected. This can be achieved by having the user input parameters which define the user's initial financial state. Alternatively, the computer system may select prestored initial parameters for some or all of the required parameters to define the initial state. This would be useful when the user is first becoming acquainted with the system and desires only to do a "test" run to become familiar with the system. Having the computer select the initial default parameters would also be useful when the user omits inputing one or more necessary parameters as where the user does not have enough information to enter an accurate parameter and desires only that the parameter be a reasonable approximation of the typical value of that parameter.

At step **109** an incremental period is selected. In the home buying scenario, since the investment term is ten years and the incremental period is one year, step **109** would require the selection of one of the ten one-year periods. This step may be performed by the user as where the user desires to enter parameters for a specific year. Step **109** may also be performed by the computer as where the computer is prompting the user to enter parameters for a specified year. In step **111** parameters are assigned to the period selected in step **109**. This is typically done by the user who hopefully has enough information to enter accurate parameters. However, if the user chooses not to, or cannot, enter accurate parameters, the computer may use default values as above in

the case of using default values to set the initial parameters at step **107**.

Where the steps **109** and **111** of respectively selecting incremental periods and assigning parameters to the selected periods are performed by the user, one of the user input devices, such as keyboard **9** or mouse **11** of FIG. **1**, may be used. In a preferred embodiment of this invention to be described below, display screen **5** of FIG. **1** would show incremental periods as columns on the screen and would show parameters associated with each column as rows within that column. The user could then, by means of keyboard **9** or mouse **11**, move a cursor (not shown) on the screen from parameter to parameter. Moving the cursor horizontally from column to column would achieve step **109** of selecting an incremental period. Moving the cursor vertically from parameter to parameter within the column and modifying the parameter would constitute step **111**, that of assigning a parameter to the incremental period. The user would be free to modify each of the parameters indicated by the cursor position by pressing additional buttons on either the keyboard **9** or mouse **11**, as, for example, by entering a numerical value using the numbered keys on a typical keyboard. Many workable procedures for achieving steps **109** and **111** are possible and all are considered within the scope of this invention.

Step **113** looks at whether there are more parameters to assign to incremental periods. This decision can be made by requesting the user to indicate whether or not the user desires to enter more parameters. Alternatively, the computer system may prompt the user for parameters until all parameters have been entered. In either case, where there are more parameters to assign, step **109** is again repeated along with subsequent step **111**. Note that it is not necessary to first select an incremental period before assigning parameters. In other words, parameters can be entered and then assigned to an incremental period, that is, steps **109** and **111** may be reversed.

At step **115**, the result for the first period is calculated using the initial data and parameters assigned to the first period. At step **117**, results are calculated for successive incremental periods using the result from a preceding period and any assigned parameters for the successive periods being calculated. Also, at step **117**, some of the parameters from the initial data may be used. Step **119** looks to whether there are any periods left with uncalculated results. If so, execution continues at step **117**. If there are no periods left to be calculated, execution falls to step **121** where the results are displayed for the user. The method ends at step **123**.

The math models used in the analysis require that the incremental period results be calculated sequentially. That is, the calculation for year two in the above sample could not begin until the results were obtained for year one.

The screen display **201** of FIG. **4** shows a preferred embodiment for accomplishing some of the steps of the method described above in reference to FIG. **2**. Screen display **201** is comprised of information on the computer screen **5** of FIG. **1** which is also indicated in FIG. **4**. The information on the display screen may be text such as headings **207**, numbers or values such as **209** and graphics such as the boundary **211**. Display screen boundary **203** shows the limits of the screen **5** upon which information may be displayed.

Items at the top half **221** of display **201** are parameters in the initial set of data for the financial analysis system. The items discussed in connection with a financial analysis system will most likely be numerical values. However, the present invention's method for displaying help text is applicable to other systems in which an item may be a character, word, alphanumeric string, symbol, collection of symbols, or a graphic. The text **219** is a descriptor for value **213**. Highlight **215** is a reverse video area which causes value **213** to appear in the illustration as white on black instead of black on white as would be the case where highlight box **215** was not surrounding value **213**.

Highlight box **215** may be moved to select different values to be modified. Typically this movement can be achieved with a keyboard such as keyboard **9** of FIG. **1**, where dedicated keys such as the arrow keys on the keyboard indicating up, down, right and left may be used. A device such as mouse **11** could also be used to move highlight box **215** in accordance with the mouse movement. Highlight box **215** may be moved from its current position to highlight value **223** by moving the box to the right or it may highlight value **225** by moving the box downwards. Additionally, other methods may be employed to allow "wraparound" of the box to value **227** by moving the box upwards or the box may be allowed to "jump" from value to value. These methods of cursor movement are well known in the art.

Once positioned over a value such as **213**, that value may be modified by pressing a key such as the standard "return" or "enter" keys (not shown) on keyboard **9** and then entering a new value by means of numeric keys (not shown) on keyboard **9** of FIG. **1**. In this way, step **107** of FIG. **2**, that is selecting the initial parameters, may be achieved. Note that in the preferred embodiment screen display **201** only allows the user to select a subset of the initial parameters. The remainder of the initial parameters are on additional screens which may be accessed by using additional keys on keyboard **9** such as "page up" and "page down".

The lower section **229** of screen display **201** presents parameters for incremental periods. The incremental period parameters are shown as columns **231**. Each incremental period column has a heading such as **233** and has values such as **235** and **227** arranged in rows under the column heading.

In this analysis the term of investment is ten years and the incremental period is one year. However, only five columns are shown on screen **201**. This is because the column with heading **237** pertains to incremental periods for years 5 through 10. Thus, the parameters under heading **237** will be used in calculating the six incremental periods, periods 5 through 10. To select an incremental period, the user positions highlight box **215** within one of the five columns. Parameters are assigned by modifying one of the two values within the column in a manner to analogous to the discussion above for entering parameters for the initial data set. Again, as with the initial parameters, the incremental period parameters may be spread out over more than one screen. In the preferred embodiment, both the initial and incremental parameters are spread over six screens which are accessed by using the "page up" and "page down" keys.

FIG. **5** shows another screen **237** which shows a second set of column headings **239** coinciding with the column heading **231** of FIG. **4**. Highlight box **241** is now over value **243** corresponding to the parameter for current salary as indicated by descriptor **249**. Note that there are no values for descriptor **249** under columns other than the column for the incremental period for year one. However, the periods other than the year one period do have a parameter absent from year one, namely "salary increase" indicated by descriptor **253**. Looking at the column for year one, it is shown that the

blank space **245** exists where the corresponding parameter for "salary increase" would be. Thus, it is shown that a given incremental period may or may not use the same parameters as other incremental periods. In the preferred embodiment, moving the highlight box downward would cause the highlight box to move from the value **243** to value **247**. Moving the highlight box to the right from its position as shown in FIG. **5** would cause the highlight box to cover value **251**.

The above discussion shows how steps **109** and **111** of FIG. **2** may be accomplished. The user may continue to select columns and assign parameters by repeating the above-described steps. The user may indicate that no more parameters are to be assigned by pressing a key on the keyboard such as the "ESCAPE" or "F4" keys. In this way step **113** of FIG. **2** is implemented.

After all parameters have been assigned, computation of the results proceed in accordance with steps **115**, **117** and **119** of FIG. **2**.

FIG. **6** shows a screen display **301** of the results from the analysis. The results display is presented in columnar form with each column corresponding to the incremental period of one year. In the result screen **301** of FIG. **6**, each of the results for the incremental one-year periods may be viewed, although only five periods are shown at any one time. The system accepts a user input such as a right arrow key press from the keyboard to display the results for an additional year. For instance, if the user were to press the right arrow at the screen display as shown in FIG. **6**, years 1, 2, 3, 4 and 5 would be replaced with the results for years 2, 3, 4, 5 and 6, respectively. Using the right and left arrow keys, the user can display the results for years one through ten as a display of any five consecutive years at one time.

The ability to input and display parameters and calculate and display results for incremental periods is an advantage of the present invention over prior art systems. This method allows the user to take into account discrete or one-time instances of events which affect their financial status. For example, referring to FIG. **4**, values **235** and **227**, corresponding, respectively with the real estate appreciation rate and a return on cash investment, can be modified for each of years 1, 2, 3, 4 and 5–10. In this way, the user can take into account a trend such as a projection from a qualified real estate market analyst that the home price appreciation rate will be increasing over the next ten years. The manner of presentation of parameters utilizing incremental periods is self explanatory in that the average lay person understands instantly from looking at the display **201** of FIG. **4** the purpose of the parameters and the effects of inputing yearly variations in the parameters.

Further, the result screen **301** of FIG. **6** is an efficient and concise means of presenting the results of a complicated financial analysis to the user. For example, by looking at the ending total cash results **303**, the user can determine the effect of terminating their investment (i.e., selling the home) in each of any of the 10 years. If the user sells the home in year 3, value **307** which shows $58,674 is the amount which the user would realize according to the financial analysis. In prior art systems, in order to obtain information such as that shown in screen **301**, a user would typically have to run the investment analysis ten times, once for each of the incremental periods, changing the initial data set each time the analysis is run.

The preferred embodiment of the present invention provides many result parameters in an easily understandable fashion, such as "end of year cash" **305**, shown in FIG. **6**. This shows the user's assets such as savings accounts and other investments, not including the home investment, and gives the user a clear indication of their ability to maintain the home investment throughout the investment term. As an example, if the values for the end of year cash **305** were progressively decreasing or became negative, it would mean, respectively, that the user was heading towards insolvency or became insolvent. Other prior art financial analysis systems show results plotted on a graph, requiring the user to interpret the gap between two curves which causes an ambiguous result. Also, results in graph form are not as intuitively obvious as simply providing account balances for each incremental period.

FIGS. **3A** and **3B** show a logic flow diagram for a method to present help text on a display screen. The display screen initially displays items of information which could comprise text numbers and graphics (initial text). A problem arises when it is necessary to explain, by means of additional text, the meaning of various items on the screen. Often there is not enough area to display the help text and initial text at the same time. Also, when it is desired to explain the "flow" or sequence of actions occurring on the screen, the standard single help text box is inadequate.

FIG. **3A** shows entry point **309**. It is assumed that at step **309** the display screen is presently displaying information such as shown on screen **301** of FIG. **6**. The user could initiate entry into the routine of FIGS. **3A** and **3B**, for example by pressing the F1 key.

In step **311** of FIG. **3B**, the program executing on the computer system will set a variable representing the current page of help text to indicate that the current page of help text is the first page of help text. Step **313** retrieves data from a data structure to obtain the area dimensions of the current page. Step **315** retrieves the text for the current page and step **317** retrieves the number of arrows, if any, for the current page.

The information retrieved in steps **313**, **315** and **317** can be contained in a single data structure or multiple data structures. The use of one or more data structures can be implemented in any number of ways known in the art. For example, the text area dimensions can be stored as two sets of XY coordinates, indicating the upper left corner coordinate and the lower right corner coordinate. A parameter which is a pointer to a location in computer memory where the current text resides may be retrieved at step **315** and the number of arrows for the current page could be an integer value. At step **319** the item which the help text is explaining is displayed in the help text box. This can be merely using the item in a sentence which describes the item. Where the item is a number, the use of the number within the help text helps to identify the number being discussed.

At step **319**, different help text may be selected according to the value of the number (assuming the item is a number). In the preferred embodiment, one set of help text will be displayed if the number is negative and another set of help text will be displayed if the number is positive. This helps to alert the user to important situations, such as insolvency, which arise due to a change in parameter values for a particular analysis.

Finally, at step **321**, the text for the current help page is displayed in the help text area on the screen.

FIG. **7** shows the same initial display as in FIG. **6**; however, help text **323** is overlayed onto the initial display as would appear after execution of step **321** of FIG. **3A**. At step **327** of FIG. **3A**, software executing on the computer would check whether there are any arrows to be displayed. Assuming for the moment that there are no arrows to be

displayed, execution proceeds to step **329**, which draws a text boundary around the help text as shown by boundary **325** of FIG. **7**. At step **331** of FIG. **3B**, the user may exit the help tutor mode by pressing the escape key, thus causing the execution to terminate at **333**. If the escape key is pressed, the screen display is restored at step **332** and the routine is exited at step **333** so that the user is returned to the display **301** of FIG. **6**. The rewrite screen display step **332** will rewrite the screen and restore it to its original display **301** before exiting.

The user may continue on to the next page of help text by pressing the page down key, in which case execution will be routed by step **335** to step **337**. Step **337** checks whether the help text being displayed is already at the last page. This would be indicated by the current page counter having a value equivalent to the last page. If that is the case, execution will return to step **331**; in other words, the user will not be allowed to proceed to the next help page since there is none.

Assuming at step **337** that the current page counter is not set to the last page, execution proceeds to step **339** and the current page is incremented to the next page. Similar to the pressing of the page down key, the page up key may be pressed by the user. This is checked at step **341**. If the page up key has not been pressed at this point, it would mean that neither the escape, page down, or page up keys have been pressed and the user is returned via path **343** back to step **331**; that is, the system will continue awaiting one of the key presses, escape, page down, or page up.

Assuming the page up key is pressed at step **341**, execution falls to step **345**. If the current page counter is at the first page, the user will not be allowed to increment the page and execution returns through path **347** back to step **331**. If the current page counter is not set to the first page, then the current page counter is decremented to indicate the previous page of help text at step **349**. At step **351** the display screen is rewritten in a manner similar to the rewrite step **332**. Execution returns along path **353** to step **313**, where the parameters for the new page of help text are retrieved at steps **313**, **315** and **317**. The new help text is displayed similarly to the discussion above for displaying the first page help text.

Referring to FIG. **7**, and assuming the user has pressed the page down key to access the next page of help text, the subsequent display would be as shown in FIG. **8**. Note that the page down keypress would have been detected at step **335** of FIG. **3B** and a check would have been made at step **337**, finding that the current page is not the last page so that the current page would have been incremented to the next page. The first page would have been erased by the rewrite screen display step **351**, then execution would have returned to steps **313**, **315**, and **317** to get the data for displaying the second page of help text and the screen display under the second page of help text would have been saved at step **319**. The second page of help text would have been displayed at step **321**.

FIG. **8** shows the second page of help text **355** overlying a different part of initial screen display **301** and having a different size. FIG. **8** also shows help text boundary **357**, path **359** and arrows **362** and **361**. However, at this point at step **327** of FIG. **3**, these structures would not yet have been displayed. At step **327** the software checks whether there are any arrows to display. In this case, there are two arrows to display so execution proceeds to step **364** where information indicating the paths of the arrows is obtained. This information would be another data structure which can be implemented in any of a variety of ways known in the art. One such data structure could be a point-to-point list of XY coordinates describing line segments which make up the path.

At step **366** the arrow paths, such as **359** of FIG. **8**, are drawn. Also at step **366** the arrow points **362** and **361** are displayed. In a preferred embodiment, the arrow paths and points are flashed on the screen three times in approximately two seconds to direct the user's attention to the items pointed at. Any further method for alerting the user and directing their attention to the items pointed at may be used, such as emboldening the arrow points and paths or further animating the pointing process as by showing the arrows creep up to the pointed items, highlighting the items, etc.

Execution proceeds to step **329** where the text boundary **357** is drawn. After execution of step **329**, the screen display will appear as shown in FIG. **8**.

The display of FIG. **8** shows that the help text presented in this fashion is an effective method for clearly and simply discussing items on a screen which is already filled with information. The help text of FIG. **8** discusses the items (the cash investment account and the home equity account) while at the same time maintaining a continuous display of the items in context. This is unlike the prior art which replaces the screen being viewed with an entirely new and different screen of information discussing items which appeared on the previously displayed screens. This manner of displaying help text loses both continuity and context. Other prior art systems overlay help text with the initial screen but do not "point" to the items in their initial locations on the screen and do not preserve the context of the items on the screen. Thus, the method of the present invention provides an improved method to explain the results of a financial analysis system.

FIG. **9** shows the display screen after the user has pressed the page down button in the display of FIG. **8**. Similar to the above discussion, the display screen has been rewritten from the display of FIG. **8**, that is, the help text **355** and associated boundary **357**, arrow path **359** and arrow points **362** and **361** have been replaced with the initial text. Then the current page counter was updated to indicate the next page of help text whereupon the data for displaying the new page of help text had been retrieved. Finally, the new help text was displayed. New help text **359** discusses item **361** which is pointed to by a path and an arrow point. Note also that value **363** is restated in the help text for clarity. A subsequent press of the page down key will lead to the display shown in FIG. **10**. FIG. **10** shows a new page of help text **367** which is used to describe item **365**. FIG. **11** in turn shows help text **369** describing item **371**. FIG. **12** shows help text **373** which discusses item **375**.

FIG. **9A** shows the display screen with a negative value for the "Cash, Start of Year" entry. Accordingly, different help text is displayed at **360**.

It can be seen from FIGS. **9** through **12** that the sequence of help pages discusses items which are arranged in a vertical column in a top-to-bottom fashion. That is, a discussion of the items can proceed with attention given to the logical flow of using the items in a calculation in the order that they are displayed on the screen. The item of FIG. **9** is the first item used in a calculation. From this item the item pointed to in FIG. **10** is subtracted. Next the item pointed to in FIG. **11** is subtracted to yield a result as pointed to in FIG. **12**. In this manner, not only are the continuity of the display and context of display preserved while the items are discussed in help text, but the items on the screen may be described in regard to the sequence of operations performed

on them. This is particularly useful in describing the results of a financial analysis system where values on the screen are often items in a sequential calculation and are best described by showing the order in which the items are combined or used in the calculation. The method of the present invention, therefore, provides a means for providing information to the user much like a teacher standing at a blackboard who points out and explains the purpose, function, and ordering of items on the blackboard.

FIG. **13** is another screen showing a different help text **377**. In FIG. **13**, the help text **377** is used to described relationships between two items on the screen, that is, value **379** and value **381**. This is done by pointing to each value with two separate arrow paths and points. Note that the paths serve to connect the values with the help text, and the help text is positioned on the screen so as to allow both items to be seen in sufficient context with the initial display to make the explanation readily understandable.

The above-described arrangement is merely illustrative of the principles of the present invention. Numerous modifications and adaptations thereof, will be readily apparent to those skilled in the art without departing from the spirit and scope of the present invention.

What is claimed is:

1. A method for displaying help text on a display screen in a computer system, wherein the computer is coupled to a user input device for generating signals in response to the actions of a human user, where said screen initially displays first text having a plurality of items, wherein each item is a numeric value displayed on the display screen, wherein the initially displayed first text and plurality of items describe a mathematical calculation performed by using the items in a fixed order, said method comprising the steps of:

storing a predefined data structure in the computer, wherein the data structure includes references to a plurality of the initially displayed items, wherein the references in the data structure are arranged in a predefined order corresponding to the fixed order of the referenced items;

repeating, in response to signals from the user input device, the following steps to display help text associated with the items referenced by the data structure:

selecting a reference from the data structure in accordance with the ordering of the references in the data structure;

using the computer to select predefined help text corresponding to the item referenced by the selected reference;

using the computer to determine an area on said screen large enough to contain said selected help text;

using the computer to determine a position for the area on said screen, where said position does not cause said area to overlap said item;

displaying said help text within said area;

displaying a linear pointer on said screen, where one end of said pointer is substantially near to said help text and the other end of the pointer is substantially near to said referenced item thereby visually connecting said help text with said referenced item;

displaying the selected help text in the determined position on the screen;

removing the selected help text from the determined position on the screen.

2. The method of claim **1**, further comprising the steps of:

displaying, in response to a first signal from the user input device, help text corresponding to the next item in the predetermined order; and

displaying, in response to a second signal from the user input device, help text corresponding to the previous item according to the predetermined order.

3. The method of claim **2**, wherein the user input device comprises a keyboard with first and second keys, wherein the first signal is generated by a user depressing the first key, wherein the second signal is generated by a user depressing the second key.

4. A method for displaying help text on a display screen in a computer system, the method comprising the following steps performed by the computer system:

displaying an item name on the display screen;

displaying a first quantitative value expressed as a number on the display screen at a first position adjacent to the item name;

selecting first help text associated with the first number;

displaying the selected first help text on the display screen;

displaying a linear pointer on the display screen, wherein one end of the pointer is substantially near to the selected first help text and the other end of the pointer is substantially near to the first quantitative value expressed as a number thereby visually connecting the first selected help text with the first quantitative value expressed as number;

displaying, subsequent to the "displaying a first quantitative value expressed as a number" step, a second quantitative value expressed as a number on the display screen at the first position to replace the first quantitative value expressed as a number, wherein the second quantitative value expressed as a number is different from the first quantitative value expressed as a number;

selecting second help text associated with the second quantitative value expressed as a number;

displaying the selected second help text on the display screen; and

displaying a linear pointer on the display screen, wherein one end of the pointer is substantially near to the selected second help text and the other end of the pointer is substantially near to the second quantitative value expressed as a number thereby visually connecting the second selected help text with the second quantitative value expressed as a number.

5. The method of claim **4**, wherein the first quantitative value expressed as a number is positive and the second quantitative value expressed as a number is negative.

6. The method of claim **4**, wherein one or more of the displayed quantitative value expressed as numbers are input by the user.

7. An apparatus for displaying help text on a display screen in a computer system, wherein said screen initially displays first text having a plurality of items, wherein each item is a numeric value displayed on the display screen, wherein the initially displayed first text having a plurality of items describes a mathematical calculation performed by using the items in a fixed order, the apparatus comprising:

a computer;

a user input device coupled to the computer, wherein the user input device generates signals in response to the actions of a human user;

a storing process executed by the computer system for storing a predefined data structure in the computer, wherein the data structure includes references to a plurality of the initially displayed items, wherein the

references in the data structure are arranged in a predefined order corresponding to the fixed order of the referenced items;

a user input handling process executed by the computer system for repeating, in response to signals from the user input device, steps to display help text associated with the items referenced by the data structure, wherein the user input handling process includes

a selecting process for selecting a reference from the data structure in accordance with the ordering of the references in the data structure; a help text selecting process for selecting predefined help text corresponding to the item referenced by the selected reference;

a region determining process executed by the computer to determine an area on the screen large enough to contain the selected help text;

a position determining process executed by the computer to determine a position for the area on the screen, wherein the position does not cause the area to overlap the item;

a help text displaying process to display the help text within the area;

a linear pointer displaying process for displaying a linear pointer on the screen, wherein one end of the pointer is substantially near to the help text and wherein the other end of the pointer is substantially near to the referenced item thereby visually connecting the help text with the referenced item; and

a final help text displaying process for displaying the selected help text in the determined position on the screen.

8. An apparatus for displaying help text on a display screen in a computer system comprising:

an item name display process executed by the computer system for displaying an item name on the display screen;

a first displaying process for displaying a first quantitative value expressed as a number on the display screen at a first position adjacent to the item name;

a first help text selecting process for selecting first help text associated with the first quantitative value expressed as a number;

a selected first help text displaying process for displaying the selected first help text on the display screen;

a linear pointer displaying process for displaying a linear pointer on the display screen, wherein one end of the pointer is substantially near to the selected first help text and the other end of the pointer is substantially near to the first quantitative value expressed as a number thereby visually connecting the first selected help text with the first quantitative value expressed as a number;

a second displaying process for displaying a second quantitative value expressed as a number on the display screen at the first position thereby replacing the first quantitative value expressed as a number, wherein the second quantitative value expressed as a number is different from the first quantitative value expressed as a number;

a second help text selecting process for selecting second help text associated with the second quantitative value expressed as a number;

a second help text displaying process for displaying the selected second help text on the display screen;

a second linear pointer displaying process for displaying a linear pointer on the display screen, wherein one end of the pointer is substantially near to the selected second help text and the other end of the pointer is substantially near to the second quantitative value expressed as a number thereby visually connecting the second selected help text with the second quantitative value expressed as a number; and

a help text removing process for removing the selected help text from the determined position on the screen.

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